

PERFORMANCE EVALUATION OF SINGLE ROW COTTON PLANTER

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ABSTRACT

Cotton, the white gold, is the king of textile, fibers and it is an important worldwide cash crop. The productivity of cotton in Gujarat state is about 659 lakhs bales. The sowing of cotton is labour intensive as its planting requires 3-4 man days/ha. The single row cotton planter was tested in laboratory as well as in field as per IS code: 6316-1993 with specific objectives. The cost of planting cotton by manually method is approximately Rs. 400 to 450 /ha, whereas the cost by this machine is Rs. 142.42 /ha. The field evaluation of manually cotton planter was done at speed of 1.62 km/hr with field capacity of 0.132 ha/hr and field efficiency of 79.52 %. The bulk density and moisture content of soil were 1.3 gm/cc and 20 per cent, respectively. The seed uniformity of cotton planter was observed higher as compared to manual sowing. The average labour requirement for sowing cotton in manually operated cotton planter was 15.15 man hr/ha.

KEY WORDS: *Cotton, single row cotton planter*

INTRODUCTION

Cotton provides gainful employment to millions of people in the world, who are engaged in its cultivation, trading, processing, manufacturing, fabricating and marketing. Cotton wastes mixed with grass, thin branches and leaves reduce to light compost that encourages improvement of soil. It provides more oxygen and more energy for the entire organism involved in soil fertility process. Cotton was grown in more than 80 countries and in about 30-35 million ha since 1990 (<http://www.cotton.org/index.cfm>).

China is the largest producer of cotton followed by US, India, Pakistan, Uzbekistan and Brazil. India occupies first position in the list of cotton growing countries of the world in

terms of area and productivity. India has the largest area under cotton cultivation in the world. It occupies an area of 93.73 lakh ha producing 278 million bales annually. Major cotton growing states in India are Maharashtra, Gujarat, Andhra Pradesh, Punjab, Karnataka, Haryana, Madhya Pradesh, Rajasthan and Tamil Nadu. Maharashtra with 39.73 lakh ha. area leads the first position in cotton growing followed by Gujarat with 26.23 lakh ha. The major cotton growing districts in Gujarat are Surendranagar (4.482 lakh ha.), Rajkot (2.818 lakh ha.), Amreli (2.356 lakh ha.), Ahmedabad (1.852 lakh ha.), Vadodara (1.734 lakh ha.), Bharuch (1.294 lakh ha.), Junagadh (0.587 lakh ha.), Kheda (0.321 lakh ha.), etc. (<http://www.cotcrop.gov.in/statistics.>).

Sowing is one of the most important operations in raising crops. Timely sowing has a dominant effect on germination of seed, plant growth and also plant population in the field. A poor sowing method will result in poor harvesting of crop and less yield. Important factors that affect germination and emergence of plant includes quality of seed to be planted, type of soil, uniformity of seed distribution, type of furrow openers, type of metering mechanism, distance between row to row etc. Modern farming calls for careful sowing to get the highest yield. The sowing operation involves opening the furrow to the proper depth, meter the seed, placing the seed in the furrow in an acceptable pattern and covering the seed and compacting the soil around the seed to proper degree. However, the selection of any type of sowing equipments depends upon its ability to place the seed at proper distance and depth without clusters with minimum draft and better coverage.

About 70 to 80 per cent of total cropped area of Saurashtra region of Gujarat state is covered under cotton crop. Generally, person who sow the seed by hand along the row and sow the seed in the soil which is very labour intensive, tedious, costly, and improper placement of seed etc. Now-a-days, there is a scarcity to find the labours in required numbers and at desired wages. Even if one can get it, there is no guaranty to timeliness in operation and proper plant to plant distance. Keeping the above fact in

mind, the present study was undertaken with specific objectives to test the single row cotton planter as per IS Code: 6316-1993 and to find out cost of sowing.

METHODOLOGY

The single row manually operated cotton planter as shown in Figure 1 and Plate 1 consists of hopper, planting mechanism, seed tube, furrow opener etc. The planting mechanism consists of a vertical seed rotor and receives drive motion from the ground wheel through chain and sprockets. For operation of the planter, a person pulls it from rope attached to the hook and other person steers the machine by holding it by the handle. Upon pulling the planter forward, ground wheel starts rotating transmitting motion to the vertical seed rotor in the hopper. The hopper is filled with seeds. As the seed rotor rotates, seeds are discharged to the furrow opener through a tube. The seed is then dropped in the furrow created by the furrow opener. It was tested as per IS Code: 6316-1993 at the Department of Farm Machinery and Power, College of Agricultural Engineering and Technology, Junagadh Agricultural University, Junagadh. In Laboratory test, calibration of planter, determination of mechanical damage test, seed uniformity test by sand bed method were performed. In field test, placement of seed, power requirement and field evaluation were carried out. The cost of sowing operation was calculated by straight line method.

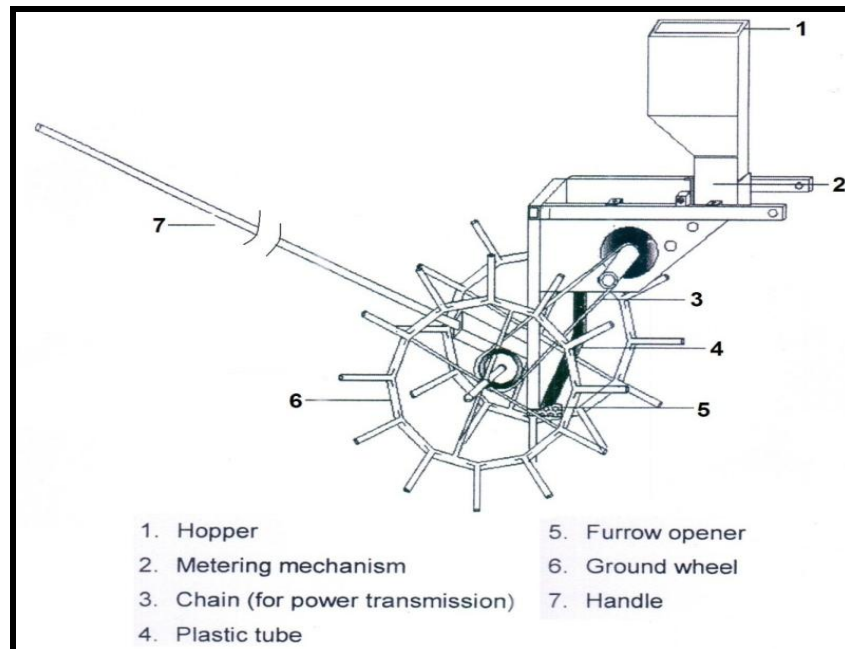


Figure 1: Schematic view of manually operated cotton planter



Plate 1: View of cotton planter in operation

RESULTS AND DISCUSSION

Single row cotton planter was tested as per IS Code: 6316-1993 at the Department of Farm Machinery and Power, College of Agricultural Engineering and Technology,

Junagadh Agricultural University, Junagadh in laboratory as well as field.

A. Laboratory Test Calibration of planter

The planter was calibrated as per recommended seed rate of cotton

i.e. 3.0 kg/ha. The calibrated seed rate was found as 3.031 kg/ha.

Seed damage test

The number of seeds with visible damage in sample was taken and mechanical damage was found as 1.236 per cent. It was very negligible.

Seed uniformity test by sand bed method

The average distance between two seeds was found about 38 to 39 cm, which was near to the recommended (40 cm). The alignment of seeds in furrow was near to the center line of furrow, which is harder to maintain in manual sowing.

B. Field Test

Placement of seed

The planter was calibrated as per recommended seed rate of cotton i.e. 3.0 kg/ha. The observations obtained from the calibration test revealed that the effect in seed rate due to the level of seed in the hopper was negligible. The seed rate was found in the field as 3.100 kg/ha.

Power requirement

The maximum draft was found as 8.8 kg. and average draft ranged from 8.75 to 8.85 kg. On the basis of draft, the average power required was worked out as 0.050 to 0.055 hp.

Field performance

The field efficiency of planter for sowing cotton was measures as 79.52% and labour requirement for sowing cotton was 15.15 man-hr/ha. The field efficiency was found good and labour requirement was low.

C. Cost of operation

The cost of sowing of this machine for cotton was Rs.18.80 per hour and Rs.142.42 per hectare.

The similar study was conducted by Sahoo and Srivastava (2000) and Mohanty et al. (2009).

CONCLUSION

From the testing and evaluation of cotton planter, following conclusions were emerged during the study.

- This planter can be used for sowing cotton in medium black soil. The pre-requirement of this machine is that, the field should be clean and free from weeds, grass and roots of previous crops.
- The design of furrow opener was in such a way that the width of cut is minimum, so that the moisture reduction from the soil was less.
- The planter has simple mechanism and can be easily operated by the farmers.
- The draft requirement of the planter was ranged from 8.75 to 8.85 kg
- The effective field capacity of the planter was 0.132 ha/hr.
- The field efficiency of planter was found as 79.52 %.
- The cost of sowing of cotton by this machine was found low as compared to manual sowing.
- The average power requirement was ranged from 0.050 to 0.055 hp.
- All these tests indicate that the planter was easily pulled by a normal man. The seed rate to be applied in the field can be controlled by changing the seed plates.

REFERENCES

- Mohanty D. K., Barik, K. C. and Mohanty M. K. (2009). Comparative performance of eight row self propelled rice transplanter and manually transplanting at farmer's field. Agril. Engg. Today(34)4, 201.

Sahoo P. K. and Srivastava A. P.
(2000). Performance of a
prototype okra planter. Jr. of

Agril. Engg. Vol.(27) 2: pg.15-
25.

<http://www.cotton.org/index.cfm>

<http://www.cotcrop.gov.in/statistics>

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